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# Real -Time Health Monitoring System Using IOT for Comatose Patients

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**ABSTRACT:** Internet of Things (IoT) based smart devices has been reshaping human life through assisting in making smarter decisions and yielding response to the users based on analysis of data. Among various aspects of life, patients require continuous care and uninterrupted monitoring. IoT makes this possible by providing real-time monitoring of various health conditions of patients. Specifically, IoT based health monitoring systems act as an effective solution for the patients and doctors. In this paper, a soft real-time health monitoring system based on an android application and a web-based monitoring portal is developed for comatose patients. Using the developed system, a doctor can monitor conditions of the patients. The system is developed using a Microcontroller and the health-related sensors. The system collects the information like heartbeat rate, blood pressure, urine level, temperature, humidity, and motion detection using the sensors. It alerts doctor if any parameter exceeds the normal limit. Moreover, it also updates status on the database and the developed application. The proposed system can effectively able to monitor the health condition of a comatose patient in real-time using IoT. Various wireless sensing networks are allowing healthcare monitoring and assisting doctors to effectively monitor their patients for their own betterment.

**KEYWORDS:** ATmega328p, Temperature Detection, IR Sensor, Webpage, Low power detection.

## I. INTRODUCTION

Coma is a severe medical condition in which a person is unconscious and unable to respond to external stimuli. Recovery from coma can be a slow and gradual process, and it is crucial to detect any signs of improvement as early as possible to provide timely medical intervention. The Smart Comatose Patient Recovery Alert System is designed to address this need by continuously monitoring the vital signs of coma patients and alerting the care taker when the patient shows signs of recovery. The "Smart Comatose Patient Recovery Alert System" is a project that aims to assist in the recovery of coma patients by using Arduino-based technology. The system utilizes various sensors, including a vibration sensor, temperature sensor, and eye blink sensor, to monitor the vital signs of coma patients. When the patient shows signs of recovery, such as eye blinking or changes in body vibration, the system generates an alarm through a piezo electric buzzer and sends an SMS alert to the care taker via a GSM modem. The patient's overall status is also displayed on a 16x2 LCD screen. Coma is a critical medical condition that requires close monitoring and timely intervention for better recovery outcomes. Patients in comatose state are unable to communicate or move, making it challenging for healthcare providers to detect any signs of improvement. To address this challenge, the Smart Comatose Patient Recovery Alert System has been developed using Arduino, eye blink sensor, temperature sensor, vibration sensor and GSM modem.

## II. RELATED WORK

The paper about 'Smart Comatose Patient Recovery Alert System' addresses the limitations of the existing system by automating the monitoring process using Arduino-based technology. The system uses vibration sensors to detect changes in the patient's body vibration, temperature sensors to monitor the patient's temperature, and eye blink sensors to detect eye blinking. When the system detects any signs of recovery, such as increased body vibration, critical temperature levels, or eye blinking, it generates an alarm through a piezo electric buzzer and sends an SMS alert to the care taker via a GSM modem. The patient's overall status is also displayed on a 16x2 LCD screen for easy monitoring. The advantages of the proposed system are numerous. Firstly, it provides continuous monitoring of the vital signs of

the coma patient, allowing for early detection of recovery signs. This can significantly reduce the chances of missed opportunities for timely medical intervention. Secondly, the system automates the monitoring process, reducing the labor-intensive nature of manual monitoring and minimizing the risk of human error. Thirdly, the system provides real-time alerts to the care taker through SMS, enabling timely response even when the care taker is not physically present. Lastly, the LCD display provides a convenient way for the care taker to monitor the overall status of the patient at a glance. This paper discusses the use of using the comatose patient monitoring system very economically and functionally without having any manual errors to provide better healthcare services to the patients.

### III. METHODOLOGY

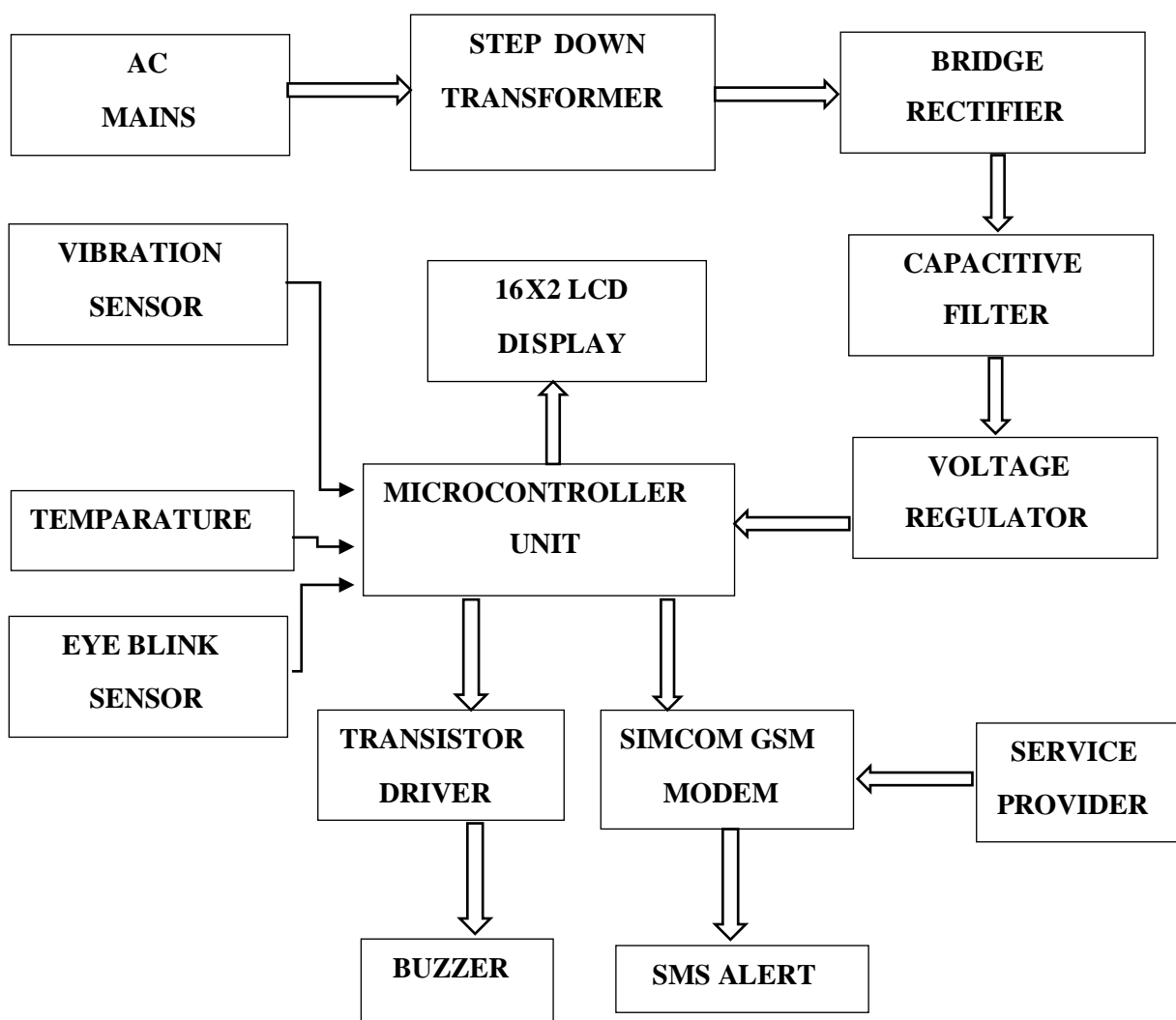


Fig.1 Comatose Patient Monitoring System.

ATmega328p microcontroller

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O)



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pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.



Fig.2 ATmega328p microcontroller.

#### ECU Power Supply

A regulated power supply is very much essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate. The AC power supply gets converted into constant DC by this circuit. By the help of a voltage regulator DC, unregulated output will be fixed to a constant voltage. The circuit is made up of linear voltage regulator 7805 along with capacitors and resistors with bridge rectifier made up from diodes. From giving an unchanging voltage supply to building confident that output reaches uninterrupted to the appliance, the diodes along with capacitors handle elevated efficient signal conveyed.

#### Temperature Sensor

The LM35 can be applied easily in the same way as other integrated-circuit temperature sensors. It can be glued or cemented to a surface and its temperature will be within about 0.01°C of the surface temperature.

This presumes that the ambient air temperature is almost the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature. This is especially true for the TO-92 plastic package, where the copper leads are the principal thermal path to carry heat into the device, so its temperature might be closer to the air temperature than to the surface temperature. To minimize this problem, be sure that the wiring to the LM35, as it leaves the device, is held at the same temperature as the surface of interest. The easiest way to do this is to cover up these wires with a bead of epoxy which will ensure that the leads and wires are all at the same temperature as the surface, and that the LM35 die's temperature will not be affected by the air temperature.

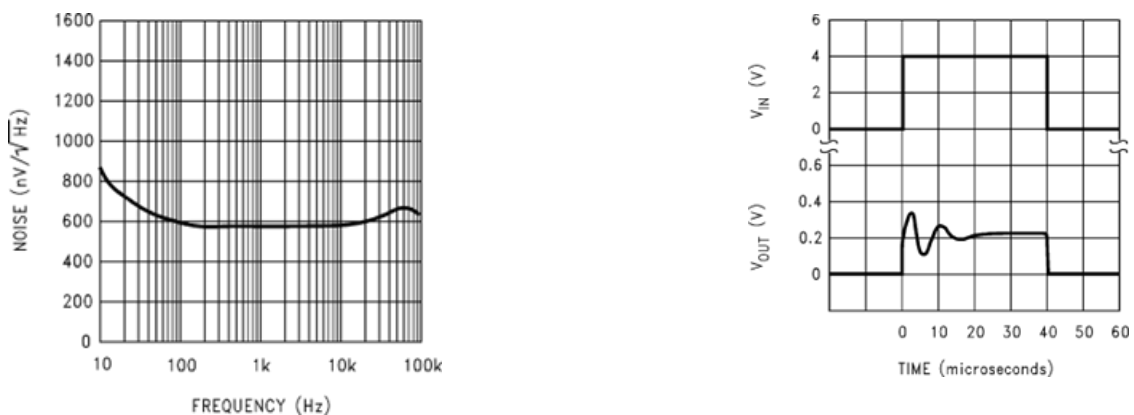


Fig.3 Performance Data Regarding Temperature Sensing.



#### Grove Vibration Sensor

The Grove - Vibration Sensor (SW-420) is a high sensitivity non-directional vibration sensor. When the module is stable, the circuit is turned on and the output is high. When the movement or vibration occurs, the circuit will be briefly disconnected and output low. At the same time, you can also adjust the sensitivity according to your own needs. All in all, this is a perfect module for vibration or tilt sensor.

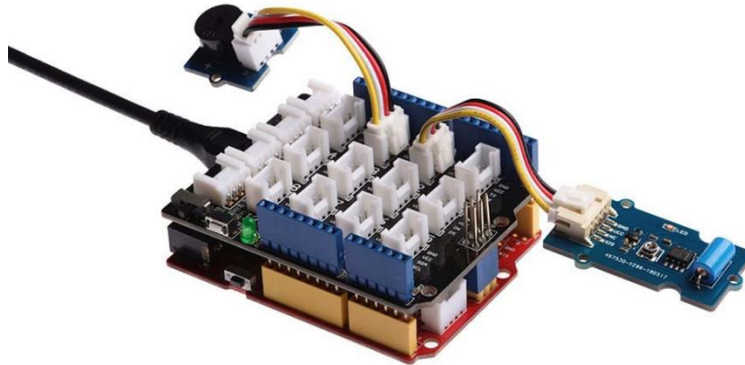


Fig.4 Grove Vibration sensor used.

#### IV. CONCLUSION

The Smart Comatose Patient Recovery Alert System offers a reliable and automated solution for monitoring the vital signs of coma patients and detecting signs of recovery. The system's ability to provide continuous monitoring, real-time alerts, and convenient display of patient status makes it a valuable tool for healthcare professionals and care takers in managing coma patients. The proposed system has the potential to improve patient outcomes by enabling timely medical intervention and reducing the risk of missed opportunities for detecting signs of recovery. Further research and development in this area could lead to the wider adoption of such systems in clinical settings.

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